THE

VETERINARY JOURNAL

FEBRUARY, 1914.

Editorial.

THE TRANSMISSION OF MANGE FROM ANIMALS TO MAN.

That "mange" is transmissible from animals to man is a fact which cannot be too well known, and a further instance given on a later page is worth drawing attention to. Medical men are not always acquainted with the fact that there may be some connection between an irritable skin complaint in human patients and an itchy dog, and a consultation with a veterinary confrère may often help to enlighten them.

It is not only the dog which is likely to prove an offender, but the horse and others of our patients may transmit the parasite, too.

Since mange in horses has become a notifiable disease, the statistics reported each week to the Board of Agriculture show that the disease is one which is indeed very prevalent, and it was quite time that stringent measures were adopted to counteract its spread.

Mange in dogs ought also to be notifiable, as it is the second most contagious disease (distemper having the first place) of these animals, and legislation for the dog is sure to follow sooner or later on much the same lines as at present for the larger animals,

for their intimate contact with man's household and the incontestable proof of their being the carriers of disease ought to make the regulations for the control over disease in them of at least equal importance to those which are merely used as beasts of burden.

THE UP-TO-DATE AIDS TO VETERINARY DIAGNOSIS.

It is interesting to consider what advantages the present-day practitioner has over his predecessor of fifty years ago, and it is also interesting to note how eager he always is to take advantage of them. The use of cocaine as a diagnostic agent in certain forms of lameness and the value of the Röntgen rays, especially for the smaller animals, together with modern ideas of asepsis, have altogether done away with many doubtful points in making a diagnosis, and have converted a hesitating opinion into a certainty.

The numbers of cases over which one went to work almost in a blindfold fashion are diminishing rapidly, and we are able now to diagnose with certainty in instances where one could only surmise before.

The advantage of a correct diagnosis is too obviously apparent, and it is in improvements in this direction that vast strides have been, and will still be, made. The treatment must, of course, share equally in importance from the practitioner's point of view, but in the absence of a correct diagnosis it is often futile.

There is room, however, for a more extended use of our opportunities, and it would help our profession forward with enormous strides if only more written records could be obtained. Mistakes, as well as successes, recorded in the clinical columns of the various professional journals would not only benefit the suffering animal world, but be of incalculable value to the writer himself as well as to his professional brethren.

General Articles.

A REPORT ON FOOT-AND-MOUTH DISEASE IN IRELAND IN 1912 TO THE DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

(Abstracted.)

(Continued from p. 23.)

In order to test more fully the view that this affection was not foot-and-mouth disease, experiments were made on other animals with material taken from the mouths of the cattle at Luggyvallen and Loughgall. These experiments resulted in the production of the same conditions in the mouths of some of the inoculated cattle, but no foot-and-mouth disease lesions, nor any constitutional disturbance, resulted. Having regard to the fact that foot-and-mouth disease is an eruptive fever characterized by the production of vesicles, it is significant that no fever was produced and no vesicles formed in any animals during the experiments, and further, that sheep and pigs experimented on did not react.

It is important also to note that on January 1 a veterinary inspector of the Board of Agriculture and Fisheries visited Armagh and saw some of the affected cattle. He expressed the opinion that the conditions appearing in these animals were not those of foot-and-mouth disease.

Further light as to the nature of the disease affecting these cattle came from statements made by local veterinary surgeons who had been for a considerable time extensively in practice in the north of Ireland. Three of these gentlemen stated (and the fact was confirmed by one of the Department's inspectors who had before his appointment been in practice in the north) that they had for years met with this condition in cattle, and that, so far from being regarded as foot-and-mouth disease, it was looked upon as an ailment of so trivial a nature that veterinary aid was seldom sought in connection with it.

Total Prohibition of Landing in Great Britain.

On the discovery of foot-and-mouth disease in Liverpool amongst animals of Irish origin, the Board of Agriculture and

Fisheries immediately prohibited, by an Order dated June 28, the landing at any port or place in Great Britain of cattle, sheep, goats or swine brought from Ireland. The Department had themselves taken a similar prohibitive step as regards landing in Ireland of animals from Great Britain, on June 24, on receipt of intimation of an outbreak of the disease at Penrith, in Cumberland. This action was followed by both Departments by a prohibition of the landing of hay and straw. For some time, therefore, all movements of animals between Great Britain and Ireland were suspended, and for a much longer period—extending to upwards of seven months—all movements of hay and straw between the two countries were stopped. But in the case of the export of animals from Ireland to the British markets, on which the cattle trade of this country so greatly depends, so extreme a course as the total stoppage of the export trade could only be justified as a temporary expedient. This fact was recognized by the British authorities as well as in Ireland, and consequently, before any long period had elapsed, arrangements for a partial resumption of the live-stock traffic from Ireland to Great Britain came under consideration. These arrangements were pursued throughout the whole period of foot-and-mouth disease in Ireland, and though the entire question assumed before long a complex and difficult character, it was found possible to maintain, with some temporary interruptions, a gradually widening system, modified and adjusted to meet the shifting conditions of the time. A brief review now follows of the successive steps in the progress of these dispositions.

The British Board's "Animals (Landing from Ireland) Order of 1913."

The arrangements for shipment of Irish animals to Great Britain have, so far as landing and movement on arrival there are concerned, since been co-ordinated and incorporated in a single Order of the Board of Agriculture and Fisheries—the Animals (Landing from Ireland) Order of 1913—which came into force on January 30.* This Order provides for the shipment of animals from all the customary cattle shipping ports in Ireland to special landing places in Great Britain defined by

* This Order has since been modified by a further Order of the Board, which came into operation on June 7, 1913. In accordance with the latter Order, the period of detention has been reduced to ten hours, and three additional landing places have been provided, viz., Barrow-in-Furness, Heysham, and Fishguard.

Orders of the Board, and set apart specifically as landing places for Irish animals. These landing places are situate at the ports of Birkenhead, Manchester, Holyhead, Fleetwood, Bristol (two landing places), Cardiff, Deptford, Glasgow, Ayr and Dundee. The shipment of sheep and swine for store purposes as well as cattle is permitted under this Order. On arrival at a landing place the animals are detained under veterinary observation for the prescribed period of twelve hours, which is reckoned from the time of landing of the last animal of the cargo, and during this period they are kept from contact with all other animals. A proper and sufficient supply of food and water is required to be provided by the occupier of the landing place for the use of the animals during detention. The occupier is entitled to charge the owners for food supplied, at rates fixed by the Board. After the animals have been discharged they must again be supplied by the owners or consignees with sufficient food and water. The Order lays down the procedure to be adopted in case of discovery of cattle-plague, pleuro-pneumonia, foot-and-mouth disease, or sheep-pox, in animals at a landing place, and rules are also prescribed to govern cases of sheep-scab and anthrax. The Order also contains regulations regarding disinfection of the landing place, and of persons and clothes.

Swine exported from Ireland are, in addition to the provisions of the Order, subject to compliance with the Board's Swine Fever (Movement from Ireland) Orders of 1904 and 1906.

Success of Department's Measures in Preventing Spread of Disease to Great Britain.

In connection with this matter of the varying arrangements for the shipment of Irish cattle to Great Britain, one significant fact is worthy of special notice. During the period of foot-and-mouth disease in Ireland, that is to say the last six months of 1912, 690,860 ruminant animals and swine were exported from this country to Great Britain. But in no single instance amongst all these thousands of animals was a genuine or established case of foot-and-mouth disease found at any British port. This striking circumstance bears strong testimony to the thorough effectiveness of the Department's measures for confining the disease within the scheduled areas, and preventing the spread of contagion to other parts of Ireland or to Great Britain.

THE COST TO THE STATE OF THE FOOT-AND-MOUTH DISEASE OPERATIONS.

The varied activities which fell to the Department in combating and eradicating foot-and-mouth disease cast a very considerable expenditure on the Department's funds. The sum provided in the original estimates for the year 1912-13, laid before Parliament, to meet expenditure—other than on swine-fever work—incurred in carrying out the provisions of the Diseases of Animals Acts, was the normal one of £200 only. It may be mentioned that in cases where expenditure is of a widely fluctuating character, such as that for foot-and-mouth disease, and of a kind where it is impossible to foresee, at the time when the original estimates are framed, whether any expenditure whatever may be incurred, it is the practice of the Treasury to insert only a token provision in the original estimate.

It accordingly became necesary to obtain a supplementary estimate in January last to cover the net expenditure incurred. The gross expenditure at that time amounted to £45,500. The sale of carcases fit for food had realized £7,300. Deducting this amount from the gross expenditure, and deducting also the token provision of £200 in the original estimate, a balance of £38,000 remained, which was provided by means of a Supplementary Estimate.

The gross expenditure to March 31, 1913, was £46,841. The sale of carcases of slaughtered animals fit for food realized £7,326, and miscellaneous receipts amounted to £77, leaving the net expenditure £39,438. The expenditure of £1,238 in excess of the £38,200 provided in the Parliamentary vote was met from the General Cattle Diseases Fund.

The principal items making up the gross expenditure of £46,841 were:—

Remuneration of *additional* veterinary inspection staff, numbering thirty, and of local veterinary inspectors employed	£5,427
Travelling and maintenance expenses	6,824
Cost of slaughter of animals, burial, disinfection, liming of lands, dressing of carcases fit for food, cartage, and other miscellaneous expenses	6,410
Compensation to owners of slaughtered animals ...	28,030
Overtime of temporary clerks, messengers, &c. ...	150
	£46,841

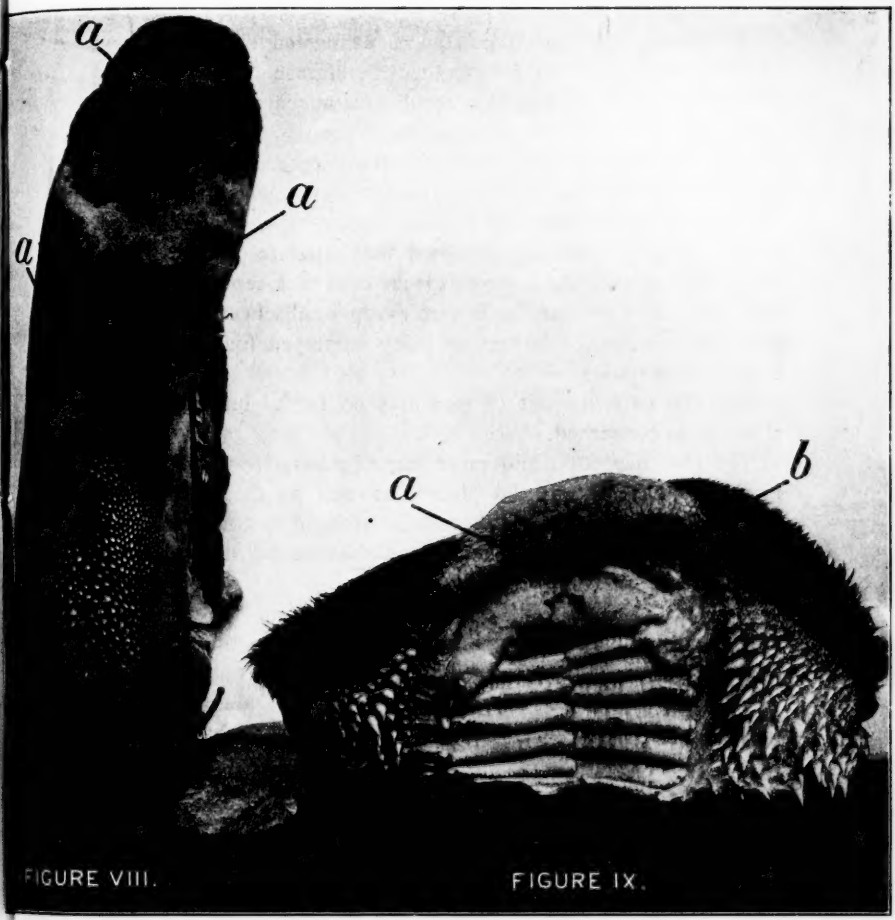


FIGURE VIII. FIGURE IX.

Tongue of bullock with foot-and-mouth disease. *a*, *a*, *a*, erosions of mucous membrane after rupt re of vesicles.

Upper lip, dental pad, and part of palate of bullock with foot-and-mouth disease. *a*, erosion of skin on border of lip after rupture of vesicle. *b*, recently ruptured vesicle on inner surface of lip, with epithelium still adhering. (Group No. 3.)

XUM

APPENDIX A.

REPORT OF MR. D. S. PRENTICE, M.R.C.V.S., CHIEF VETERINARY INSPECTOR.

In considering the circumstances connected with the recent series of outbreaks of foot-and-mouth disease in Ireland, and having regard to the fact that the disease appeared in sixty-eight places within a period extending from June 30 to November 7, 1912, it would seem convenient for the purpose of reference to group these places according to the counties in which the disease occurred and the dates when the outbreaks were discovered, each infected place being regarded as a separate outbreak.

In dealing with the disease as it arose at each centre the duties cast upon the veterinary staff were exceptionally heavy, a distinct and separate staff of inspectors being employed for each of the following purposes:—

(*a*) The carrying out of measures so far as infected places alone were concerned.

(*b*) The inspection and recording of animals on farms, &c., in the vicinity of infected places, as well as the tracing and examination of live-stock moved to other districts before the imposition of restrictions in the neighbourhood in which the disease appeared.

(*c*) The inspection of animals concerned in the necessary movement of live-stock on licence within or into the scheduled districts, and

(*d*) In the case of Group No. 1 (County Dublin, &c.) the *post-mortem* examinations of animals in public abattoirs and slaughter-houses.

GROUP NO. 1.

Number of infected places 21
Number of animals affected with foot-and-mouth disease ... ... 215 cattle, 1 sheep
Number of animals (including diseased) slaughtered, 1,257 cattle, 1,081 sheep, 26 swine, and 16 goats.

The initial outbreak of foot-and-mouth disease in Ireland was discovered at Drynam, near Swords, on June 30, by one of the Department's veterinary inspectors, among a lot of forty-five cattle. Twenty-four of these animals were found to exhibit

well marked clinical symptoms of foot-and-mouth disease, salivation, smacking of the lips and lameness being noticeable features. The disease was evidently well established on the farm, and had, it appears, been mistaken for actinomycosis (timber tongue).

In this outbreak the affection was of a comparatively benign character. In some instances the fever stage of the disease had passed at the time of discovery, but lesions on the tongue, lips and feet of cattle were observable in different degrees of progression. These conditions ranged from newly formed and recently ruptured vesicles with the inflamed corium exposed (the epithelium in some instances still clinging to the edges of the raw surface) to rapidly healing lesions. The diseased cattle, in addition to the in-contact animals, were slaughtered without delay, and upon *post-mortem* examination further indications of the malady were observed in twelve others, making a total of thirty-six affected animals out of a herd of forty-five cattle.

On the day following the discovery of the disease at Drynam further cases were reported and confirmed on lands within a mile distant from the first outbreak, and from that date onwards outbreaks occurred at intervals on farms in the vicinity until August 14, when the disease appeared on the seventeenth separate infected place. These outbreaks were no doubt of a secondary character. The district around Swords comprises extensive grazing lands which at the time were especially well stocked with animals, and the disease probably spread from farm to farm owing to their contiguity to each other or to the movement of persons from places before the affection was discovered thereon.

Eleven of the outbreaks were brought under notice for the first time by the Department's veterinary inspectors when examining live-stock on the farms throughout the district; but while this was the case there were, on the whole, little grounds to consider that any desire existed on the part of owners of animals to conceal the disease when it appeared among their herds. In the case of two of the outlying places in the County of Meath where the disease was found to exist, local veterinary surgeons were first called in by the owners to examine suspected cattle, and, after arranging for precautionary measures, they communicated the facts to the Department. In the remaining instance in Meath where the disease appeared, and also in the

XUM

case of the County Louth outbreak, the owners of the cattle reported the existence of the disease in the usual way, measures being taken to isolate the affected animals awaiting the decision of the Department.

A large staff of the Department's veterinary inspectors were constantly employed in examining the animals on the farms for a few miles around Swords, and in the neighbourhood of the infected places in Meath and Louth, with a view to detecting the first appearance of disease on the lands, and in order that means might at once be taken to deal with any extension of the outbreak. This procedure, together with the prompt and stringent measures adopted at places known to be already infected, resulted in preventing the outbreak extending more rapidly than it did among the numerous herds of animals in the district.

The movements of animals from farm to farm were prohibited by special service of restriction notices, and a record was kept which would at once lead to the discovery of any animals taken from or added to these places; and while no general slaughter of all suspected animals at the infected centres took place, the slaughter of the affected cattle, and those in contact which it was considered would most likely become diseased, was promptly carried into effect.

The thorough cleansing and disinfection of all premises where the disease existed, and the disinfection of all persons or things likely to convey infection, were rigidly enforced. Large quantities of hay and straw in stacks were on a number of the infected places, and, in a number of instances, it would appear that diseased animals had been in contact with them. The hay and straw were disinfected without damage by a special process of super-heated steam.

The disease varied in severity in these outbreaks. In some of the affected herds mouth lesions alone were noticeable, and the constitutional symptoms were on the whole not severe. In other instances, however, especially where milch cows were concerned, the disease assumed an aggravated character, the invasion usually was rapid, erosions and other characteristic lesions were extensively noticeable on the mouths, feet, udders and teats (in milch cows), and the animals were reduced to a state of prostration.

GROUP No. 2.

Number of infected places 5
Number of animals affected with foot-and-mouth disease ... ... 13 cattle
Number of animals (including diseased) slaughtered, 66 cattle, 31 swine, 6 goats.

The initial outbreak of foot-and-mouth disease in this Group was discovered at Corravehy by the local veterinary inspector in the course of his practice, and confirmed on August 28 by the Department's officers. Two cattle in the herd were affected, and these with the in-contact animals were slaughtered. The first of the animals found to be diseased was a cow which had recently been to a bull in the neighbourhood, and in tracing the movements of other cows that had also been with this bull, three further cases of foot-and-mouth disease were discovered by the Department's inspectors on another farm in the district. Five additional cases occurred on the farm where the bull was located, and upon all animals on the place being slaughtered, the tongue of the bull was noticed to have a healed lesion such as would result from foot-and-mouth disease.

Two further outbreaks of the disease were discovered in the district, one of which was reported by the owner, the other being found by a Departmental Veterinary Inspector when examining animals in the neighbourhood.

The disease as it appeared in this district was of a comparatively mild type. In the case of all the affected animals tongue lesions of the disease were present in one stage or another. When seen by the veterinary inspectors, the constitutional symptoms had mostly subsided, but salivation was especially noticeable. The country where these outbreaks occurred consisted of small farms, and the animals grazing thereon were comparatively few in number. The farms in the neighbourhood of the infected places were constantly visited during the period of restrictions by veterinary inspectors of the Department, with a view to the early detection of any case of the disease which might appear in animals thereon, and, in order that a check might exist on the possible movement of live-stock from or on to any of these farms, the usual records of animals found on each place were maintained.

Thorough cleansing and disinfection of each infected place (as far as was practicable) and the disinfection of all persons and things likely to convey the disease, was carried out under the supervision of the Department's officers.

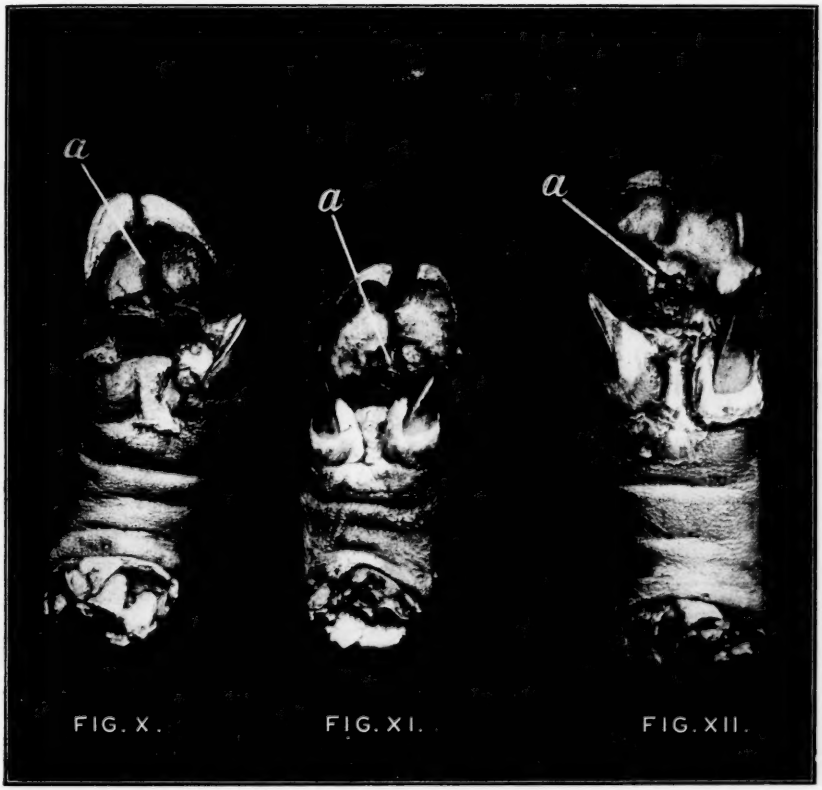
There is nothing to indicate how the disease was in the first instance brought into this district. The different outbreaks were, however, doubtless connected with each other. Most of the infected farms were comparatively near to one another, and considerable movement of live-stock had taken place in the vicinity before the initial outbreak was discovered.

GROUP NO. 3.

Number of infected places 5
Number of animals affected with foot-and-mouth disease ... ... 26 cattle, 14 swine.
Number of animals (including diseased) slaughtered, 172 cattle, 137 sheep, 24 swine.

The initial outbreak of foot-and-mouth disease in this Group occurred at Ballysax, County Kildare, and was brought under official notice through the agency of a local veterinary surgeon, who was called in by the owner to examine sick animals on the place. The disease was confirmed by Departmental officers on August 28. In all eight cattle and fourteen swine were found to be affected, and were slaughtered. The remaining animals on the farm, consisting of 17 cattle, 122 sheep, and 8 swine, were also slaughtered, it being considered likely that the disease would extend to them.

On September 2 a report was received that a bullock was suspected to be affected with foot-and-mouth disease at Kinneagh, a farm adjacent to Ballysax. The existence of the disease on this place was at once confirmed. There were ninety-seven other cattle grazing on the farm, belonging to upwards of twenty different owners, and it was necessary to consider whether the circumstances were such that the disease would probably extend to any or all of these animals, but in the meantime measures were taken to isolate the herd as far as was practicable. On September 6, however, another bullock on the place showed lesions of the disease, and it was determined to slaughter the entire lot of animals on the farm. At the date of slaughter fifteen cattle in all were attacked.



Back view of feet of swine affected with foot-and-mouth disease. *a*, *a*, *a*, ruptured vesicles. (Group No. 3.)

From Kinneagh the disease spread to an adjoining farm at Sunnyhill, where one bullock was found to be affected and was forthwith killed. On this farm and on adjoining land thirty-five other cattle and eleven sheep grazed. All of these animals were, as a precautionary measure, slaughtered without delay.

The disease also appeared at Lugatryna and Dunlavin Upper, in the County of Wicklow, distant about six miles from the County Kildare outbreaks. At Lugatryna the outbreak was reported by the owner and confirmed by the Department's officers, and at Dunlavin Upper the disease was discovered by one of the Department's inspectors when examining live-stock on farms, the affected and in-contact animals being slaughtered.

The disease in County Kildare assumed a somewhat severe type; the constitutional symptoms observable were well marked, and in many instances lesions of the affection were found on the tongues, lips and feet of the animals attacked.

In the case of the swine at Ballysax vesicular lesions on the lips and feet were exhibited. The animals were in a distressful condition, and at the time of slaughter the horny parts of the feet of some of them had sloughed off.

The cleansing and disinfection at infected places in this Group, as in other cases, was (as far as was practicable) carried out in a thorough manner, under the supervision of the Department's inspectors.

The proximity of the Kildare outbreaks to the extensive Curragh grazing lands, on which thousands of sheep were grazing at the time, was a constant source of anxiety to the Department. These sheep were placed under special restrictions, and inspectors were continually engaged in inspecting them, as well as other animals in the neighbourhood, fearing the possibility of further extensions of the outbreak. Fortunately, however, the disease did not extend to the Curragh grazing lands.

As in the case of other outbreaks of foot-and-mouth disease, a number of theories were put forward respecting the manner in which disease was originally conveyed to Ballysax. These on investigation were proved to be unfounded. One of these theories, as related to the Department, was to the effect that the swine at Ballysax had been bedded with straw which reached the Curragh Camp as packing material for certain goods, and

it was assumed that this straw might be of foreign origin. It was ascertained that no straw from the Camp was brought to Ballysax; but from inquiries which were instituted it would appear that the swine had been fed on swill from the Camp, and from this fact the rumour as to the straw would seem to have gained currency. Further, it was learned that any vegetables mixed in the swill were of Irish origin. A number of other persons around the district had also fed swine on swill from the Curragh Camp. These animals were carefully examined, without the discovery of any trace of disease.

From Ballysax the disease was evidently conveyed to Kinneagh and the adjoining infected place at Sunnyhill. Passing from the Ballysax direction there are footpaths through Kinneagh, which are constantly used by pedestrians, and it is probable that the infection was conveyed to Kinneagh in this manner before the discovery of the Ballysax outbreak.

There is nothing to show how the disease was conveyed to Lugatryna and Dunlavin Upper.

GROUP NO. 4.

Number of infected places 37
Number of animals affected with foot-and-mouth disease ... ... 112 cattle, 1 swine.
Number of animals (including diseased) slaughtered, 426 cattle, 315 sheep, 19 swine, 9 goats.

The initial case of foot-and-mouth disease in this Group occurred in the town of Mullingar. On October 18 a local veterinary surgeon reported to the Department that he suspected the existence of the disease in Mullingar, and on the same date outbreaks were confirmed by the Department's veterinary inspectors on five different places in and adjoining the town. On the following day six other outbreaks were confirmed in the neighbourhood, and the disease spread with more or less rapidity until November 7, when the thirty-seventh outbreak was reached, but by that time the disease was well under control.

All of the places infected were within a radius of about four miles from Mullingar, and, with the exception of one or two instances, the disease did not spread beyond a mile from the town. Owing, however, to the rapidity with which the infection did extend, these outbreaks were calculated to cause greater

alarm than any of the preceding ones in Ireland during the year.

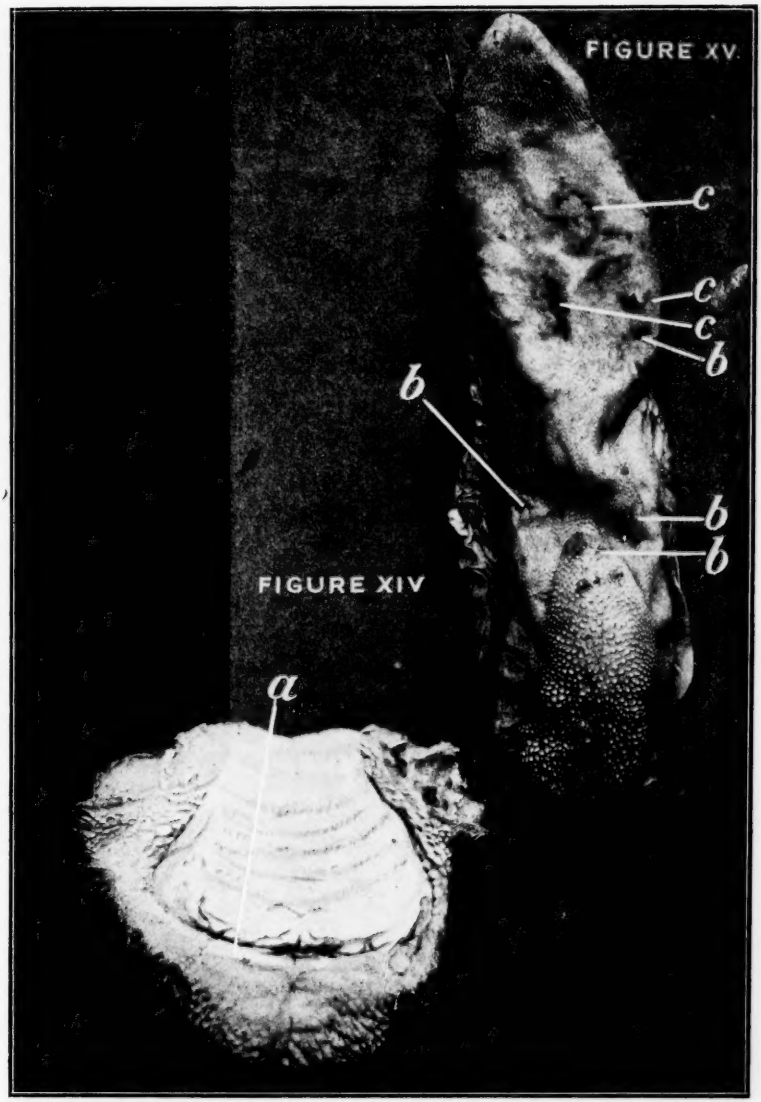
It is probable that the disease existed for a few days about Mullingar before being actually recognized and brought under official notice. The history of some of the earlier cases in the vicinity of the town, as subsequently ascertained, and the condition of the lesions observed on certain of the affected cattle, tend to corroborate this view.

The rapid manner in which the disease extended in the earlier days of its invasion is attributable to the fact that residents in Mullingar, owning small lots of cattle, including milch cows, moved some of them daily from the byres situated in the town, along the public streets to the town parks, where the animals grazed. By these means cattle housed in different portions of the town were in frequent contact with each other, or passed over the thoroughfares about the same time each day; and it has been ascertained that some of the animals so moved were actually at the time the subject of the disease in its early stages. The grazing lands were in a number of instances contiguous to each other, and the infection spread from herd to herd owing to this cause also, and possibly in some cases by the movement of persons from places where the affection was subsequently found to exist.

With one exception it was considered necessary in the case of each infected place to slaughter all susceptible animals thereon —non-infected as well as diseased—and also certain other animals in proximity to some of the infected places.

A special feature of this outbreak was the number of different lots of cattle which it was ascertained had been moved to other districts from the neighbourhood of Mullingar immediately before the outbreak was discovered. These were, however, followed up, examined, and placed under restrictions. It was considered necessary as a precautionary measure to slaughter certain of these animals which, it was ascertained, had been moved from the immediate vicinity of infected places about Mullingar. In all instances, however, no disease was discovered amongst these cattle.

An unusually large staff of inspectors was employed in connection with these outbreaks, owing to the number of infected places which required to be dealt with at the same time, and the



(NEWRY-BIRKENHEAD CASE.)

Dental pad and lip of bullock and tongue of same bullock shipped from Newry to Birkenhead on December 3, 1912.

a, part of dental pad and lip from which a thin layer of superficial epithelium has been removed.

b, brown-coloured markings (centres from which layers of superficial epithelium commence to peel off). *c*, superficial epithelium commencing to peel off tongue.

(Tongue shrunken and distorted owing to preservative.)

XUM

extended area in which farm-to-farm inspections of live-stock were made. During these latter operations seven of the outbreaks were discovered by the veterinary inspectors.

Taken as a whole the disease may be regarded as of a severe type. The characteristic appearances of the malady were present in the case of all the affected cattle, and were especially noticeable where milch cows were attacked. The constitutional symptoms were frequently of an aggravated character. A large number of the animals exhibited lesions on the feet as well as on the tongues and lips, and, in the case of milch cows, on the udders and teats. In some instances the lesions were abundant on the parts concerned.

None of the sheep on the infected places contracted the disease.

The cleansing and disinfection of the infected places was carried out as thoroughly as possible by the veterinary inspection staff.

No evidence has been obtained which would show how the disease was conveyed in the first instance to Mullingar, but there is no doubt that all the thirty-seven outbreaks were directly or indirectly connected with one another.

In addition to the live-stock concerned in the outbreaks of foot-and-mouth disease, no less than 378 animals suspected of the disease in different parts of the country came under notice of the Department's veterinary officers within the period from July 1 to March 1. On examination and investigation all of these animals proved to be free from foot-and-mouth disease. The large majority of these suspected cases were easy of diagnosis, but difficulties arose in some instances, and it may be interesting here to refer to a few cases of this kind discovered at or in connection with the cattle shipping ports.

On November 28 a large consignment of store cattle were being inspected at Dublin port preparatory to their shipment to Dundee. Among these animals were a lot of eighty bullocks which for some months previously had grazed together on lands in the County of Meath. On being "mouthed," a lesion was discovered on the surface (near the tip) of the tongue of a bullock The mucous membrane had been removed to the extent of about an inch square, and, when discovered, the abraded surface was in a semi-healed condition. There were no feet lesions. Except

for the condition of the tongue the animal was in a perfectly normal state of health. The abrasion on the tongue would not have been discovered had not the bullock's mouth been opened during the process of examination. The appearance of the tongue simulated that which might possibly result in the case of an animal which was affected with foot-and-mouth disease and had passed the infective stage of that malady. A searching examination was made of the remaining bullocks of the lot, and of other animals in the inspection yard, but nothing further of a suspicious character was discovered.

No case of foot-and-mouth disease had occurred in the district from which the bullocks had been moved prior to their arrival at the port for shipment, and it would appear that nothing abnormal had previously been observed in respect to this animal, or other animals comprising the lot. The length of time the lesion must have existed, the period the cattle had grazed together, and the absolute freedom of all the companions of the bullock from any appearance of disease whatever, strongly discredited the suspicion that the abrasion observed on the tongue of this otherwise healthy animal was due to foot-and-mouth disease, and, upon a decision being arrived at that the condition had arisen from a cause other than foot-and-mouth disease, and the owner having expressed his willingness to slaughter the bullock and hand over its tongue to the Department, the cargo of 486 cattle was allowed to proceed to Dundee. Immediate steps were taken, however, to inspect all the animals in or about the farm in the County of Meath from which the bullock came, but no appearance of disease was found, and nothing was elicited which would tend to indicate that any sickness for which foot-and-mouth disease might be mistaken had occurred in the vicinity.

(To be continued.)

DIET DEFICIENCY AND DISEASE IN LIVE STOCK.*

By FRAS. EVELYN PLACE, B.Sc., M.R.A.S.E., B.V.Sc., M.R.C.V.S., M.R.I.P.H., &c.

Veterinary Lecturer to the Department of Agriculture, South Australia.

Gentlemen,—Highly as I esteem the honour of being invited to submit a paper before such a learned and erudite body as the Australasian Association for the Advancement of Science, and much as I appreciate the opportunity held out by that body to enable the veterinary surgeons of the Commonwealth and Dominion to foregather under the ægis of its patronage, I feel that, as a comparatively new-comer, I should more fittingly assume the *rôle* of a postulant at the feet of such Gamaliels than take upon me the robe of a teacher, and it is in this frame of mind that I venture to occupy your attention for a short while with some of the aspects presented by the connection between diet deficiency and disease in live stock. Some of the phenomena attracted my attention many years ago during dry summers upon the moors of Devon, but during the Indian famine of 1904-5 I began to collate certain symptoms and to assign to them in my own mind a chemico-physiological importance in the conditions which prevailed among the live stock in the famine-stricken desert of Rajputana; and upon my arrival in Australia some three years ago I found in Victoria and South Australia that the minds of stockowners were being exercised over similar if not identical problems, quaintly named in the latter State "Dry Bible" and "Coasting," while Tasmania and New Zealand meet with trouble possibly more akin to the English forms in "Midland Disease" and "Bush Sickness," and South Africa joins in with Lam and Stieffziekte; and in the face of all of them the veterinary profession has unfortunately to admit its ignorance of the causative factors and has to adopt empirical remedies, such as bone meal, and to endure a certain amount of scorn from the ignorant and unscientific who know all about it, while the profession is still delving amid the mass of contradictory reports and confusing symptoms in an earnest, and I hope soon to be successful, endeavour to elucidate the reason of phenomena noticed.

If I may be allowed, I would revert for a few moments to a number of diseases which affect ourselves, and which I may

* A paper read before the Australasian Association for the Advancement of Science, Veterinary Section, Melbourne, 1913.

refer to as belonging to groups, such as the beriberi, the scurvy and the pellagra groups, and which are recognized by a large and increasing number of scientists as yielding to suitable diet; and I would class myself among the believers that they are caused by deficiency of certain food elements, the absence of which has a marked and serious effect upon tissue metabolism in nerve, muscle and bone; a group of organs which compose about 60 per cent. of the bodies of our domestic animals, and which hitherto have received more attention from the breeder of live stock than from the veterinary surgeon, if we omit those which build up the legs of a horse, in which the Psalmist warns up not to put our trust, plainly with prophetic vision foreseeing the advent of motor traction and its effects upon the income of the veterinary practitioner.

For a moment I will briefly sketch the symptoms of beriberi as I have seen them occurring in some poor wretch who has vainly been endeavouring to keep body and soul together upon a handful of mouldy, weevilly rice, and then I will try and draw a parallel from a horse dying in the ninety-mile desert.

The patient loses weight till he is reduced to a skeleton; œdema, contractions, paralysis and anæsthesia of the limbs, marked nervous symptoms, due apparently to degeneration of the peripheral nerves and those of the heart muscle, followed by death or recovery without any treatment beyond a change of locale, with most probably important additions to the defective diet. So much for the human animal, now for the equine. The collar grows too large, fresh holes have to be punched in the girths, the legs swell and the spur vein fills, he trips and totters, and without notice collapses on the sand without a groan or struggle, with spume at the nostrils and nought but hide upon his ribs.

Or look for a moment at a case of scurvy, with its anæmia and cachexia, its local hæmorrhages and hæmorrhagis inflammation, the spots upon the ribs, their dislocation from the cartilages, with perhaps neuritis and anæsthesia of the limbs, and compare it with a coasty heifer, with her bloodless eyes and bottled jaw, her gaspy breath, due to her ribs failing to distend, her tottering walk and swollen fetlocks, and, finally, her feeble, helpless efforts to control her limbs and raise her wasted carcase.

Is not one justified in asking: Are these mere coincidences,

or is there not a closer connection? For my own part I think there is, and it is interesting to note how veterinary surgeons have accepted and rejected the same theories with regard to this class of disease, as have members of the sister profession, though they have worked apart. Intoxication, auto-intoxication, infection, and even the photodynamic theories, like ancient dynasties, have risen, held their sway and gone, while now the deficiency theory has been hinted at by Theiler, Gilruth and Aston, though but tentatively and as through a glass darkly. For to us the proteid has been a mass, a pyramid viewed in the mist of early dawn, and in the noonday heat its building stones have but afforded us shelter while we slept; their individual characters, their cryptic signs, are still to seek, and perhaps at eventide there shall be light.

The cow, with her hide-bound belly and stiff stretched neck chewing the bones of some less lucky mate, has suggested the want of phosphorus, and kindly consideration has provided a bone meal lick; but is not this significant of a certain amount of rough-and-ready argument forced upon the veterinary surgeon by the pressing need of staying the plague, and is it not characteristic of a certain roughness in feeding experiments which have been carried out? We see the proteid, the carbohydrate, and the fat, the tricolour which proclaims the revolution, but we are deaf to the groans the gabelle raises, we think the miller but dips out a negligible mite, we wonder when red ruin racks our state, we fail to miss the amides of our meadow hay, we ignore the subtle ethers which scarce move our chemists' scale, and wonder when our beast falls never to rise again.

Led by the chemist, whose accuracy far exceeds our own, we have framed standard diets with correct nitrogenous ratios, we have carefully balanced the income and the outgoing—at least in theory—and our American cousins have also in fact, in some careful series of experiments, especially those carried out at Wisconsin, without success. Here in Australia we have no data *re* the composition of our common food-stuffs, we know less about them than we do of the component parts of a German sugar beet or an Indian millet, and our ignorance falls upon our own heads in the nemesis of dry bible and coast. South Australia, at least, is endeavouring to lift the veil of this darkness, but many years must elapse before the observations and experiments now

being carried out at the Agricultural College, Roseworthy, can be finalized, though from time to time parts of them may be available. Up to now we have no Australian analysis of cockie chaff or wheaten hay, our grasses and native clovers are unknown quantities, but when we seek them out we must remember that caloric figures are incomplete records of the value of a foodstuff, and that the innate metabolism of a grain has a physiological value which we cannot weigh or count in figures. In short, that the feeding value of any food is based upon a most complicated chain of factors, each dependent on the other, till the mind becomes dazed at the number of combinations any one series may present.

The appearance of the stock in the dry districts of South Australia leads one to think that a very large amount of feeding value of their forage is expended in maintenance, more than the five-twelfths of Kellner's observations; even those which are keeping their condition give one the impression that too great a proportion of their energy is expended in managing to live; to use a feeder's expression, they have no "bloom," or, in butcher's terms, they "kill light." A somewhat extensive acquaintance with these beasts in the slaughterhouse supports this idea; their musculature is devoid of intermuscular fat, and its water content is far too high proportionately, so they shrivel when they set and resemble biltong more than beef, and when canned their gravy is gelatine rather than jelly.

A high proportion of this class of beast has an acid reaction with the urine, which is also the case in dry bible and in some forms of coast disease, anent which it is interesting to recall the note in Smith's "Physiology": "When the herbivora are starved their urine gives an acid reaction." Now, as physiologists, we must look further than the kidneys and bladder for the origin of this change, and we find it no doubt in the muscles. This is not the place, nor, if it were, would time permit to go into detail as to the chemical changes in the muscles, but it is worth noting that they become strongly acid in reaction when the call upon their endurance is excessive, either as labour or as deficiency in nutriment. In this connection we must call to mind the fact that food deficient in nutriment not only fails to nourish, but also lowers the digestibility of nutritious food fed with it, so that large feeds of straw chaff with a modicum of

XUM

inferior wheat, such as form the standard diet of many horses, do not conform to the requirements of their system even when liberally diluted with sand, nor are they calculated to produce meat or milk.

At first glance the analysis of certain straws does not show them to be entirely unsuited for use as food, but wheat straw seldom shines out well, Kellner's figures being: Water, 13·6; nitrogenous substances, 3·3; fat, 1·3; soluble carbohydrates. 39·4; fibre, 37·1; ash, 5·3; with a digestibility of less than a third of its weight.

And this is the diet on which a large proportion of Australian stock are supposed to find their nourishment. For an analysis of wheaten hay we have to go to America, and it is by no means improbable that the analyses made there are those of a fodder differing in many effective elements from the same substance here, but it shows a marked improvement in the nutritive ratio, and reveals the fact that cockie chaff probably saves the situation. It is to be hoped that the Roseworthy experiments and observations will set this matter more clearly before the feeder. The careful study of the analyses of the common fodders in use in Australia is of value, but analysis alone is most misleading, digestibility is a better guide; but assimilation is not synonymous even with this, as the appearance of stock on much country where undoubtedly they are digesting a fair proportion of what they eat clearly shows, for frequently a change to land which does not seem so good brings about an alteration for the better. When dealing with metabolism in the tissues we are dealing with only a limited series of factors; metabolism in the fodder itself while growing, and after cutting and while in store, to say nothing of the natural action of the enzymes of the digestive juices in partnership with those of the fodder, are all issues which have to be studied both alone and in conjunction. In Australasia live stock present the symptoms of the great groups of deficiency diseases observed in man: the beriberi group is typified by the so-called epizootic paralysis and the disease in horses where the collapse is so sudden that death may occur upon a journey without warning, reminding many who went to the war in South Africa of the fatal horse sickness prevalent in that country, whose lam ziekte and stiffziekte have their counterparts here in neat stock as coasting and dry bible. The scurvy group appears in horses, cattle and

sheep in forms widely known, but generally receiving local and often unmeaning names, such as crankums, rheumatoid arthritis, and so on. The pellagra group also have their counterparts in skin and stomach lesions in the central and northern districts of Australia, the midlands of Tasmania, and the north island of New Zealand, a chain of tracts which have in common scarcely any climatic or botanic similarities, which fact almost forces on one the necessity of falling back upon physiological resemblances.

Fagopyrismus in cattle and epizootic paralysis in horses naturally turn the thoughts to the study of the balance of metabolic factors and their influence on the major physiological processes in live stock, because they are instances of the disastrous effect of very slight alterations in those balances. Among physicians one school scoffs at the laboured triturations of the other, which in turn smiles in pity upon the germ bespangled broths and jellies of the other; and both in turn are the sport of yet a third party which, while deriding drugs or sera, agitates the public mind with the desire for frequent change both in venue and diet, to say nothing of habits and thought, and between them Nature waves her wand and produces eggs and cream, lamb chops and Murray cod, strawberries and apples, ale and tea, all just proteids, carbohydrates, fats and water, yet every one distinctly different and pleasing in their variety by their distinctive characters, which are to a great extent amides or amido acids almost negligible from an analyst's point of view, but recognizable by the working bullock that suddenly pulls up to crop some succulent weed by the roadside, or the colt which, browsing by its dam, picks off the dainty tops that please its palate; and even the farmer seeks for them when at this time of year he bemoans the fact that pastures, so good three months ago, are not able to carry the stock now, though, minus the water, the crop upon them is probably, weight for weight, richer in proteids, &c., than it was then.

And here we must pause a moment to consider an important factor which probably has much to do with deficiency in Australian fodder, namely, the fact that plants grown in dry heat are deficient in many of their natural amides, that when present these undergo metabolic changes which render them unadapted to the use of stock—a fact unpleasantly forced upon my notice some few years ago in Burma, by the untimely and numerous deaths of

XUM

ponies fed upon *Phaseolus lunatus* and similar legumes grown in a dry district, while lower down in the moister parts the same plants were fed regularly without harm, and I have no doubt that the contradictory reports about soya beans in England arise from the conditions under which they have been grown, in spite of the similarity of the analyses in all such cases.

Recent investigations by the Commonwealth statistician have demonstrated the curious effect upon the birth- and death-rate of varying quantities of moisture in the atmosphere as applied to man, and the practical farmer daily demonstrates the same thing in his movements of stock, while the creek and the waterhole seem to be the determining factors in the utilization of the amides in the fodder illustrated by the saying I heard some thirty years ago in the Riverina, that if the sheep could have a blade of grass one day and a drop of water the next they could weather through the drought, but with the grass alone they could lie down and die.

Research has demonstrated that in the large nerve organs as well as in the peripheral nerves of animals that have starved, or in the polyneuritis of pigeons and in the impaction paralysis of cattle there is a marked deficiency in the normal phosphorus content of those organs, despite the fact that phosphatic content of their food has been ample; and one knows how very disappointing, from a therapeutic point of view, the administration of phosphorus proves to be in many cases, while in others it seems to act like a charm. A series of analyses of the phosphorus contents, both actual and relative, of the otoliths in paralytic stock would probably illuminate the obscurity of many of the symptoms.

When one considers that the caloric energy of bad grass hay, as compared with good grass hay, is very little more than half, and that five-twelfths of the amount of food eaten has to be used for maintenance; also that the wastage of bad hay is double that of good, and that the more inferior the fodder is the greater the depression of digestion; also that when in conjunction with these factors they are all intensified if the water supply is insufficient, one is bound to consider that under some Australian conditions live stock must be chronically upon the verge of starvation, which, as a matter of fact, is just the impression that I gained when first studying these conditions, although an absence of thirteen years from England and an extensive acquaintance with the appearance of stock in India under famine conditions

should have familiarized me with the symptoms of existence under such disadvantages. One notices that when phosphorus is available as when bone meal is given the nerve lesions are minimized, but that the appearances compatible with bloom and health are only restored when natural fodder in an actively growing stage is to be had, unless one makes an exception in the case of stock receiving ensilage, a form of nourishment in which, if the natural amides have undergone change, their place is taken in some degree by ferment products nearly allied to them. In this connection one's mind reverts to the empiric remedies of currants and yeast, the administration of which is undoubtedly followed by a measure of success in this class of disease which cannot fairly be attributed to a merely mechanical action upon the ingesta.

One other point must be called to mind before we commence to collate the clinical facts we have been considering, and that is the frequency with which enlargement of the thyroid is met with in the class of disease under consideration. One finds this in all classes of stock—colts, calves, mares, geldings, cows, and steers—a list which excludes those whose generative organs are immature, or male animals which as a rule are fed with a diet of superior order.

It may be that from a clinical point of view I have not brought forward sufficient evidence to convince many that we are dealing with groups of disease resulting from diet deficiency, that is, deficiency in some essential necessary for the normal physiological processes, diseases that may still be regarded by many as intoxications (a view, I must confess, I still have a hankering after, although my faith in it is daily being undermined by the contradictory and inexact statements which are constantly being put forward with a view to make its position more tenable), but we have the fact that these deficiency diseases break out in countries where a certain unvarying diet is partaken of for long periods, while near by stock seem to be exempt from their attack, due no doubt to some minute alteration in the diet which contains the necessary protective bodies.

As I have already alluded to the similarity in the course of the symptoms I may here merely remark that the most prominent ones are found in all the diseases we are considering, namely, a general cachexia with enormous loss of weight, marked

XUM

nervous symptoms due most probably to degeneration of the peripheral nervous system, centripetal rather than eccentric. And roughly we know that all these diseases can be prevented by the addition of certain substances to the food, and in some cases when the disease is not too far advanced a cure may be hoped for.

In the case of human diseases these substances are known to be organic bases, and are termed "vitamines"; those of the beriberi group and the scurvy group being well recognized, and to some extent being interchangeable, though not always. Although veterinary research has not so far gone thus far, veterinary clinical observation, which I believe I may justly claim as being keener than that of the sister profession, has supplied the missing substances in crude form (bone meal, ensilage, cattle spices, and so forth); while the beans always considered necessary for muscular growth and fitness in training stables supply the vitamines in profusion—facts that Gryns and Eykman applied to the treatment and investigation of deficiency diseases, and which Worth and myself experimented with in Burma, finding that the protective substance is soluble in strong alcohol and effective even after this elimination of alcohol soluble proteids. The fact that the phosphorus content of some fodders acted as an index to their harmfulness or otherwise suggested that probably there was a deficiency of certain organic phosphorus compounds in the food which has sufficed for Schauman to construct his phosphorus deficiency theory.

Investigation has proved that the protective substances, whichever they may be, are: Soluble in alcohol, in acidulated alcohol, and water. Dialysable. Destroyed by heating somewhat above 100° C. They are neither salts nor proteins. They are easily destroyed by chemical manipulation, and on this account have most probably escaped the observation of earlier investigators.

Funk concluded that owing to the stability of certain substances from yeast in acid solution these protective substances are probably nitrogenous, of simple chemical nature, and belonging to the group precipitated by phospho-tungstic acid, and tracked them down till he obtained a compound with the formula $C_{17}H_{20}N_2O_7$. The quantity of this substance present is extremely small, 1 kilo yielding only 0·5 grm., and the curative dose was found to be very small indeed, but varying with con-

ditions of nerve degeneration and subsequent diet, resulting in some critics considering the substance to be merely an activator, a member of the group of hormones. Subsequent investigation, however, upsets this theory, and gives rise to another, that neuritic symptoms of starving animals are dependent not only on phosphorus deficiency, but also on nitrogen deficiency in the nerve organs, and that in the absence of the vitamine the organism cannot synthetize its nerve elements, and so deficient metabolism ensues and death results. Here the yeast and currants of the empiric tell.

Vitamine is necessary for the metabolism of the nervous tissue, and its lack forces the animal to take this substance from its own tissues. The result is enormous loss of weight, and when the available stock begins to run short there is a breaking down of the nerve tissue and the resulting symptoms, among which, in the south-eastern parts of South Australia, is the form of epidemic dropsy so reminiscent of the so-called wet beriberi.

I have already drawn the parallel between some forms of "coast" and scurvy, the latter being so prevalent on a diet of starch and preserved food, and yielding so easily to lime-juice and fresh fruit and vegetables, especially onions, as I, after some months on boiled milk and brandy, have reason to be thankful for. The prevalence of scurvy of the gums is responsible for many of the dental troubles which supervene on the attentions of quack horse dentists, and is possibly the reason for the existence of these operators.

One of the symptoms of this form of disease in cattle in South Australia is a blue hyperæmia of the gums, and in some instances ulceration, which have misled me into imagining I had lead poisoning to deal with until undeceived by chemical analysis. In human scurvy only fresh food possesses the protective power; dried material is entirely valueless; but lime-juice apparently is possessed of a greater quantity, and that more stable, and offers a promising therapeutic remedy for stock.

In the process of germination seeds are known to develop all kinds of enzymes in order to utilize their food reserves, and grains, such as oats, develop an anti-scorbutic agent after they have germinated, but they lose this power when they are dried again. This is also true when the process of ripening is not completed, so that the shrivelled wheat in Australian hay is

XUM

probably unable to carry on this process, even although its nitrogen content is high.

Infantile scurvy is not uncommon in factory-fed calves and pigs receiving waste milk which has probably been preserved by heat. And although the vitamine in milk is fairly stable it is destroyed by heat, the extent of its destruction depending on two factors: the temperature and length of time of heating. Further factors, says Funk in a passage which is pregnant with importance to Australian dairymen, are: The reaction of the milk, the natural content of vitamines in the cow's milk, which, of course, depends entirely on the content of vitamines in the cow's food, and so far we know nothing about them, except the financial loss such ignorance entails.

All the symptoms of the disease we are considering can be produced in miniature in guinea-pigs: The loss of hair and weight, the paralysis of the hind legs and catarrh of the intestines by a deficient diet, not deficient in quantity but in protective substances. And their blood is sterile, like those other beasts we deal with. The results of modern investigations in deficiency diseases are not well known to physiologists, and are practically unknown to veterinarians, though Mandel and Emil Fischer have long ago forecasted the results at which we are arriving, and have pointed out that these substances protective have been too easily overlooked.

In the metabolism experiments performed with a view of determining the nutritive value of different proteins the question of vitamines has not been considered; but if they are not present, even though the nitrogen content is high, the animal wastes and fails, and in future experiments they must be carefully considered. Abderhalden's experiments in feeding dogs with their own proteins, and his rather too premature conclusion that the question of artificial food is solved, have their value in calling our attention to the length of time an animal can survive upon its own tissues or those closely allied to them, and enable us to understand how the famine cow survives upon dried dung cakes, or the dry bible beast on mummified rabbits that have succumbed to phosphorus in overdoses.

Many years of careful work are still before us before we know much about vitamines and similar protective substances, but my purpose will have been served if by these few observations I have

succeeded in arousing among my professional brethren a fleeting interest in them, for it is quite possible that their importance is much greater than has been hinted at in this paper, and a predisposition to many other diseases may be due to a deficiency in these protective substances.

We shall see the whole importance of these protective bodies when we know for what purpose these small quantities of substances are required in the animal organism. It is obvious that the minute amount necessary cannot be considered from the point of view of food, unless they are the ambrosia and nectar of the ferments and hormones, or the favoured vintages of the internal glands, such as the thyroid and pituitary.

The further investigation of vitamines, the knowledge of their chemical composition, and their fate in the animal body should help to eliminate from veterinary phraseology such classic terms as dry bible, enzootic paraplegia, coasting, and other high- or low-sounding titles which mean nothing, and only serve to raise a smile upon the faces of those who deem we are endeavouring to hide our thoughts in words.

LITERATURE.

KELLNER. "The Scientific Feeding of Animals."
UNIVERSITY OF WISCONSIN. Various Reports on Feeding Experiments.
UNIVERSITY OF WISCONSIN. *Research Bulletins*, 14-18.
ARMSBY and FRIES. "The Influence of Type and Age upon the Utilization of Feed by Cattle."
ASTON, B. C. "The Chemistry of Bush Sickness."
Idem. Departmental Report, New Zealand, 1910.
Idem. Journal of Agriculture, New Zealand.
BRUCE. *Report, Tasmania.*
THEILER. *Agricultural Journal, South Africa.*
SHAW, T. "Feeding Farm Animals."
New York Agricultural Experiment Station Annual Report, 1901.
RENARD, A. H. "A B C of Scientific Stock Feeding."
THIEL, H. "Landwirtschaftliches Jahrbuch," 1911.
CASIMIR FUNK. *Journal of State Medicine*, 1912.
MANSON. "Tropical Diseases."
HEBRARD. "Le Beriberi."
EYKMAN. "Virchow's Archives."
FRASER and STANTON. *Lancet.*
SCHAUMANN. *Arch. f. Schiffs-u. Tropen-hygiene.*
KILBOURNE. *Philippine Journal of Science.*
MANDEL. "Physiologie."
CHITTENDEN. "Nutrition of Man."
ABDERHALDEN. "Zeitschrift f. Physiologie."
SMITH. "Veterinary Physiology."

Clinical Articles.

THE CASTRATION OF ANTELOPES AND SIMILAR SEMI-DOMESTICATED ANIMALS.

By C. A. POWELL, M.R.C.V.S.

Woburn.

Wild or semi-domesticated animals living in a state of nature are castrated in a similar way to large calves on a farm, viz., secure the head either by a noose round the horns, or if these are absent by a noose round the neck with a safety knot tied so that it cannot pull tight enough to cause strangulation. The end of this is then passed around a post or a ring in the manger and the animal's head drawn up tight. A casting rope is then passed round the animal's neck, the ends pulled level, and a noose tied with a figure of eight knot—the latter resting on the top of the withers. Each end of the rope is then passed backwards through and around the hind leg and brought up on the outside, passing under the first line and then under the neck noose. The loop is then dropped on to the heel of each foot and the line on each side pulled tight. The rope securing the head is then loosened sufficiently for the latter to come down on the ground level with the rest of the body. The animal is then pulled down and over on its back and the legs secured by the ordinary method.

Castration is then carried out with the clamp and actual cautery. The scrotum being opened on each side with a knife, the tissues of the testicle, severed from their attachments and stripped for a little distance up the cord. Both cords are then enclosed in the clamps, severed and seared. They are then released, an antiseptic dressing such as a solution of kresophen or chinosol poured in the scrotal cavities, the rope loosened and the animal allowed to rise.

For these operations plenty of strength is necessary, and when the animal is down the operation should be performed as quickly as possible. The vessels of these animals sear very quickly and easily, and according to my experience no after complications occur.

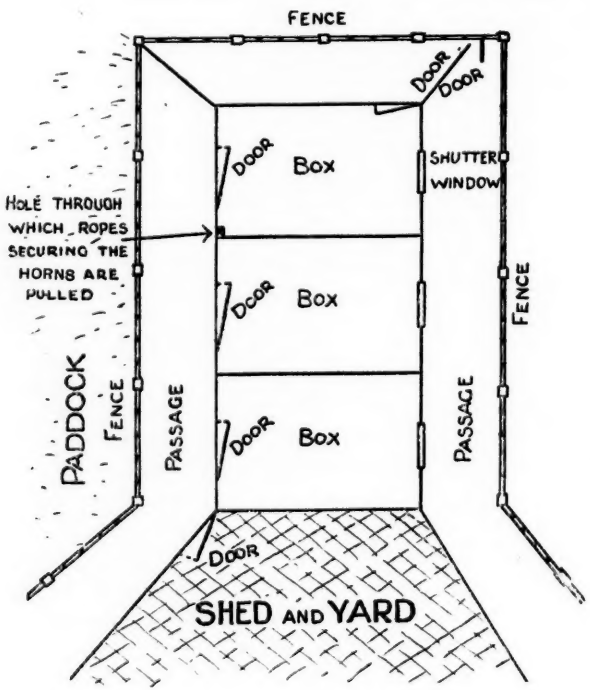
In the case of some of the wilder animals, such as the eland antelope, the securing and casting is the most difficult part, and,

owing to their great strength and activity, not altogether unattended with serious risk to the patient.

The method of procedure is as follows: The animals are first got into a yard with a shed. Leading from this is a narrow fenced passage leading along a row of boxes, each of which has a sliding door. The animals wanted are then driven along this passage and secured in different boxes. The first animal is then got into the farthest box and the door pulled sharply to. A shutter window in the opposite side is then opened—this also has a cord by means of which it can be sharply closed if necessary. The attendant or keeper, who keeps some distance from the window, then with a long wooden prop, on the end of which is adjusted the noose of a rope, endeavours to drop the latter over one of the horns. This is a matter of difficulty and requires a lot of dexterity and patience to accomplish, the animal being almost as quick with its head as with its hind legs, and that is saying a lot, and the attendant may get the prop sent flying out of his hands, getting a nasty jar in the bargain.

When one horn is noosed the animal's head is drawn up to the window by several men on the rope, and the other horn noosed with another rope. This latter is then thrown across the box to the door through which the animal entered, which is then opened and the rope taken and passed through a small opening in the boarded side of the right corner. By means of this the animal is then drawn over to the corner by men on the outside of the shed, the first rope of course being released. This is then thrown across and passed through with its fellow, and the animal is fixed. In the corner of the shed near to the shutter window is another door, which is opened, and several men carrying a shutter slightly larger than an ordinary door enter. The latter is then pushed lengthways up against the side of the animal, which is thus pinned up against the side of the box. A rope is then passed round the animal's neck and the ordinary figure of eight noose made. The knot rests on the withers and the two ends passed backwards over the hind part of the animal, and assistants holding the end of each rope. They are then dropped down on each side, and aided with a long iron rod with a hook at the end, and the kicking of the animal, are eventually got between the hind legs and drawn up to the thigh and kept tight by the assistants—who, needless to say, keep as far off the

animal's reach as possible. All this is not done without a lot of trouble, as the kick of these animals is like a flash of lightning, and delivered with immense force. When this is completed a noosed rope is got round each hind leg and drawn tight around the fetlock. The ends of these are then passed forward through the neck noose, pulling as much on the sternum as possible. The



legs are then drawn up to the noose, the animal let down, and fixed in the usual way—or as near it as it is possible to get.

This method of securing and fixing the hind legs with separate ropes was adopted because it was found that when the ends of the casting rope were brought back through the noose in the usual manner of side line casting there was, owing to the excessive struggling, great risk of strangulation occurring—these animals can almost tie themselves in a knot—and having a

separate pull on the withers from behind tended to equalize the pressure and keep the nooze well down on the lower portion of the neck.

The animal thus secured, castration is completed as follows: The testicle, which is small, somewhat rounded and very firm in consistence, is then grasped firmly between the finger and thumb of the left hand, and the scrotum, the skin of which is very thin and smooth, incised with a knife and the testicle exposed, enucleated from its tunics, which are severed at their attachments and stripped up the cord for a couple of inches or so. This is repeated with the other testicle, and both cords grasped with the clamps, severed with the actual cautery and seared, released, and scrotal wounds dressed, the whole procedure being carried out as rapidly as possible. The animal may be very stiff for a few days after this, owing to its excessive struggling. They are very bad for this, as they do not give over fighting until completely exhausted, and will renew their efforts as soon as ever they recover wind.

The dangers with these are the risk of broken limbs, strangulation and heart failure. The latter may arise from the excessive exertion, especially as I have noted on *post-mortem* examinations of these species an enormous deposition of adipose tissue around the pericardium, which, however, appears to be a normal condition, but which if met with in horses or cattle one would almost call a lipoma.

The operation completed, the ropes are taken off. The attendants leave the box and the ropes securing the horns are severed with a knife from the outside and the animal released.

A NEW (?) STRONGYLE CAUSING PARASITIC GASTRITIS IN A GOAT.

By J. B. BUXTON, F.R.C.V.S., D.V.H.
Wellcome Physiological Research Laboratories, Herne Hill, S.W.

Subject.—An aged female goat which had been acquired for experimental purposes but had not been used.

History.—The animal was gradually becoming more emaciated, although the appetite remained good. Temperature, respirations and pulse were normal, the conjunctival mucous membrane was pale, and the eyes appeared sunken. There was no diarrhœa,

XUM

but constant grinding of the teeth, with a "staring" coat, and a general "tucked-up" appearance.

Diagnosis.—The fæces were collected, mixed with distilled water, and carefully examined for traces of parasites. Numerous ovoid nematode ova were found, varying in size from 70 microns to 80 microns by 30 to 40 microns, and a few embryos varying in length from 300 to 400 microns, and resembling the embryos of *Strongylus rufescens*. No adult worms were present, however. Examination of the blood showed a fall in the number of red cells to about 5,000,000 per c.mm., and there was evidence of anisocytosis and poikilocytosis.

Treatment.—The animal was isolated and received daily 15 gr. of picrate of potash in meal. This treatment was continued for a week, but as there was no obvious improvement and the eggs

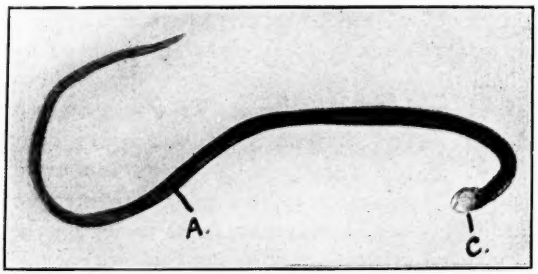


FIG. 1.—Male, showing straight alimentary canal (A) and lateral view of bursa (C). Magnified 45 diameters.

and embryos continued to be passed out in as large numbers as before, it was replaced by daily drenches of lysol ♏x in ʒviii of water. Concurrently with this, powders were mixed with the food containing pulv. ferri sulph., cinchona, nucis vom., and anisi.

There was, however, no improvement, and the animal died fourteen days after treatment was commenced.

Post-mortem examination showed marked emaciation, and almost entire absence of fat. The thoracic organs appeared normal. The intestines showed no pathological alterations, and the contents were of the usual consistence, and contained only a few ova and embryos, no adult parasites. The first three stomachs appeared normal, and showed no traces of parasites.

The abomasum, however, contained a quantity of fluid material with an offensive odour, and the mucous membrane was of a dark purple colour, very much thickened and covered by a thick layer of mucus. The fluid contents contained only a few eggs and no adult worms. The surface of the mucous membrane was scraped,

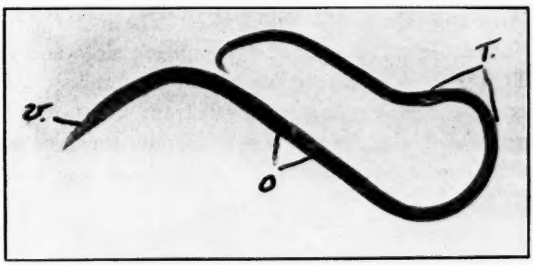


FIG. 2.—Female, showing (O), ova, (V) vulva ; (T) twist of uterus. Magnified 45 diameters.

the scrapings, mixed with distilled water, placed in a glass dish over a black surface, and search made for the usual goat nematode worms (*Strongylus filicollis*, *Œsophagostomum venulosum*,

FIG. 3.—Twist of the uterus in female. Magnified 100 diameters.

Sclerostomum hypostomum, *Uncinaria cernua*, and *Trichocephalus affinis* (Neumann)). None were, however, visible.

The liquid was then poured off and carefully examined with a 2/3 objective, and was found to contain two adult female nematode worms of a very small size, and numerous ova. It was

obvious now that the parasites were either buried in the masses of mucus, or in the membrane itself. The surface of the latter was carefully examined, but no trace of any nodules could be found. The mucus was, however, mixed with a few cubic centimetres of water and violently shaken in order to break up the masses, and 2 per cent. formaldehyde added to render the worms sufficiently opaque to be visible to the naked eye. The material was again poured into a glass dish, placed over a black cloth and examined. The fluid was now seen to contain a huge number of extremely small round worms, varying in length from 3 mm. to 5 mm., and still scarcely visible to the naked eye. Under the microscope they were found to be too opaque, as a result of the formalin, to

FIG. 4.—Caudal bursa of male. Magnified 100 diameters.

ascertain their anatomy properly, and were therefore treated as follows:—

Several of the worms were placed for five minutes in boiling 80 per cent. alcohol, transferred to a solution of one part of glycerine in 90 parts of absolute alcohol in a watch-glass, and placed in the incubator until all the alcohol had evaporated. They were now almost transparent, and scarcely visible with the naked eye. The parasites were now placed in a solution of glycerine and fuchsin, in which they were allowed to remain for one minute, were washed in glycerine, and mounted in glycerine jelly. On examination with a 2/3 objective they were found to be stained a bright pink colour, and the structure could be made out quite easily.

Anatomy.—A small filiform worm gradually enlarging in a posterior direction. The mouth is nude and represented by a slight depression from the base of which the alimentary canal begins. There is no differentiation into œsophagus and intestine, the whole being in the form of a narrow straight tube which widens out at the junction of the anterior and second fourths of the worm.

The male is from 3 mm. to 4 mm. in length, and possesses a trilobate caudal bursa, the central lobe being ill defined; each lateral lobe is supported by five rays, of which the middle three arise from a common stalk, but are separate for almost their

FIG. 5.—Diagrammatic representation of caudal bursa of male. Magnified about 150 diameters.

entire length. The spicules are two in number and of equal length.

The female is from 4 mm. to 5 mm. in length. The tail is abruptly contracted to a narrow point, is conical, and has no well marked constrictions.

The uterus is a long straight tube which occupies the posterior three-fourths of the worm, and is doubled on itself at its anterior extremity, and shows well marked transverse ridges. The vulva is situated in the posterior fourth, towards the extremity. Many of these worms show a double twist at about their centre, but whether it is uterus twisted on itself, or intestine round uterus,

it is difficult to ascertain; probably it is simply a double twist of the uterus.

The ova are not hatched in the body of the female. The worms closely resemble the strongyle of Axe, which is found in the stomach of the horse but apparently causes no ill effects, and the *Strongylus gracilis* of cattle and sheep, from which, however, they differ in several respects.

THE VACCINE TREATMENT OF MAMMITIS IN CATTLE.

By ARTHUR PAYNE, F.R.C.V.S.
Weybridge.

In my hands the ordinary methods of treatment for mastitis, or mammitis, in dairy cattle have been very unsatisfactory. By the ordinary methods I mean external applications, internal administrations of drugs and injections of medicated fluids into the glands.

The application of vaccine therapeutics is at a more or less experimental stage, and it occurred to me that here was an opportunity for the vaccine therapeutist.

Not having an extensive cattle practice, I cannot obtain the necessary number of cases to give the treatment a fair trial, and so am just giving a few cases in the hope that a practitioner with more opportunities will follow it up, as I consider the diseases affecting the mammary glands to present an ideal field for the application of vaccine therapy.

The three cases which I here place on record presented features which indicated a streptococcic origin, in that form of mastitis which is commonly attributed to the streptococci and known as sub-acute mastitis (Leblanc-Nunn).

Of course, I am quite aware that the classical treatment should consist of the formation of an autogenous vaccine, but this in an ordinary cattle practice would not be practicable on account of expense entailed in the process.

I will just give a rough outline of the symptoms presented in each case, and then the combined treatment.

(1) Shorthorn cow, in good condition (third calf), calved three months. The left hind-quarter was enlarged and indurated at the lower two-thirds, and there was a nodule at the base of the teat about the size of a horse bean. The mammary secretion was thin

watery, and flocculent. This condition had been present about three weeks.

(2) Dutch heifer (at same farm), calved three days when I was asked to see her. The right hind-quarter was inflamed, enlarged and indurated, and there was a pea-like nodule about mid-way up the true canal. It was an impossibility to draw any milk from this quarter, which was not materially changed in its physical characters.

(3) Dutch cow (third calf), calved five months. Right hind-quarter enlarged at the lower two-thirds and indurated ; milk thin and watery, and flocculent. The cowman stated that the cow's udder was normal a few days before, but this statement I very much doubt, and should consider that the condition had been present some weeks.

The vaccine consisted of killed streptococci and staphylococci (P., D. and Co. combined) subcutaneously injected into the fold of skin above the udder and anterior to the patella.

Each cow received altogether four injections, commencing with 250,000,000, and ending with 750,000,000, with three days' interval between each dose.

In each case after the second dose there was a slight improvement, the mammary secretions were more abundant, and the glandular substance was not so resistant.

A week after the last dose the heifer's quarter was practically normal in every respect. The shorthorn's was notably smaller, and the nodule decreased to half its original size.

The Dutch cow's quarter was enlarged when treatment was commenced, till the skin appeared to just accommodate the gland, but a month after treatment the swelling was so much less that the skin was wrinkled.

I am quite aware that my method of applying the treatment was crude in the extreme. I ought to have noted the thermal reaction, the various phases, changes in the secretions, systemic disturbances, &c., but both farms were some distance from my surgery, and I could not spare the time to make the necessary visits.

The cowman informed me that the day after each injection the cows "seemed a bit queer" and "tucked" (*i.e.*, increased respiration).

If other surgeons have used vaccines for mammary disease, it

would be interesting to hear the result, as I think that this treatment is clearly indicated here.

"Clinical Bacteriology and Vaccine Therapy" (W. M. Scott) is presented to the veterinary profession at a very opportune moment. I have read it with great pleasure and appreciation, and with great advantage to myself. It is a work which must appeal to every veterinary surgeon. It is written for them, and by a member of their profession, which in my opinion is a great recommendation, and every veterinary surgeon, in my opinion, should own a copy.

CONGENITAL OPACITY OF THE CORNEA.

By J. B. HARE, M.R.C.V.S.

In October last I was sent for by a wealthy client to advise as to the treatment of some cocker puppies. I found a litter of four cocker spaniels of valuable strain 6 weeks old. From my client's letter alluding to their eyes being affected, I concluded I had distemper to deal with, but this was not the case. On examination I found all four pups very lively, well nourished, and perfectly healthy, also the bitch. There were two blacks and two browns. One black pup had complete opacity of the cornea in each eye, the other black had partial opacity affecting both eyes; and of the brown pups, one showed very slight marginal opacity of both eyes, the remaining one was quite free from disease. Inquiry elicited the fact that they had never ailed anything, father and mother were free from any eye affection, and a previous litter by the same parents had normal vision. I felt certain that little could be done, and told my client so, but by way of treatment, I ordered lotio. argent. nit. gr. iii, aq. destil. ʒi, a few drops to be placed in each eye twice daily. I also ordered extra nourishment in the form of Virol to be given.

I wrote an account of the cases to Professor Hobday, and he very kindly replied, practically agreeing with my views, and advising as a trial eserin sulph. gr. i to ʒi, to be applied daily with camel hair brush. This was done, and treatment continued, alternating with previous lotion for a month. At the end of that time no improvement had taken place, and the black pup with complete opacity was destroyed. The others are being kept in the hope that they may improve. Never having met with a similar case, I record it in the hope that other practitioners may have done so and will give their views.

TRANSMISSION OF SARCOPTIC MANGE FROM DOG TO MAN.

By JOHN BUSCOMB, M.R.C.V.S.
Stroud.

In The Veterinary Journal for November, 1912, there was published an interesting summary of a number of cases in which it was clearly shown that sarcoptic mange had been transmitted from infected dogs to their human attendants.

The undermentioned brief note is penned in further corroboration of this fact, which is not, I think, sufficiently well known amongst the members of either the medical or our own profession.

Last month I was called in to treat some toy Pomeranian puppies, the subject of distemper, and my attention was also drawn to the fact that they were scratching themselves very much. Owing to their distemper illness I did not dress the skins at all, but endeavoured to nurse them through the more serious malady first.

As they did not make good progress and were of considerable value, besides being very much thought of by the owner, I consulted with Professor Hobday and sent them to his infirmary in London, where he confirmed my diagnosis of sarcoptic mange.

The particular point of interest for this article, however, is that the maid who first looked after them and nursed them very devotedly complained of a skin irritation of the arms and hands, and at Christmas time, as the owner and his household went away, the puppies were given into the charge of two neighbours, each of whom took a puppy. On my visit after the Christmas holidays each of these neighbours had caught the disease and complained of severe skin irritation, which took the form of tiny isolated (and very itchy) spots on the arms. The irritation was so troublesome that a medical man was called in to treat them, and although at first he did not recognize the source of the infection he has since done so, and has confirmed my diagnosis.

I place this on record, as I think that the fact of the very contagious nature of sarcoptic mange from dog to man should be more universally recognized.

A CASE OF TRUE HERMAPHRODITISM.

By FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.
Kensington, W.

The subject, a fox-terrier, was 9 years old and had been in the possession of the owner since 12 months old, having been purchased at the Battersea Dogs' Home. The animal was admitted to hospital with acute cystitis. All attempts to pass a catheter failed absolutely, and the urine was withdrawn through the abdominal wall by a trocar and cannula. Owing to the collapsed condition of the patient an unfavourable prognosis was given, and death occurred about twelve hours later.

Externally the under surface of the body had the well-developed penis of the male, but no testicles were visible. There were twelve symmetrically and regularly arranged teats of quite as large a size and quite as well developed as in a female of that age.

The owner stated that when passing urine the animal generally raised its leg like a dog, but sometimes squatted like a bitch; it had never been observed to try to mate either with male or female, but would sometimes follow a bitch for a short distance and then leave her.

The body was sent to the Royal College of Surgeons' Museum, and the Curator (Dr. Shattock) reported as follows: "It will make an excellent specimen, as it is essentially female within with external male characters, a very rare thing as contrasted with the contrary—at least, so far as man is concerned."

Reviews.

Horse-shoeing. By Lungwitz and Adams. London: Lippincott Co. 8vo. Price 7s. 6d. net.

Notwithstanding the coming of motor haulage, horse-shoeing still continues both a necessity and a lucrative employment for the skilled artisan. The trade has an intimate connection with the veterinary profession, in cities most veterinary surgeons being master horse-shoers, and in rural practice the smith plays no unimportant part in assisting to relieve lameness in the hoof and in adapting modes of shoeing to relieve defects in the limb. In this country horse-shoeing has remained more an art than a science; for some time an effort has been made to improve the

art with satisfactory success, but even with such an effort much still remains to be done before we can consider our registered shoeing smiths entitled to be considered scientific.

The book under review at once arrests attention and admiration from the apparent scientific treatment of the subject in all its varied aspects, and if horse-shoeing is practised by men who are conversant with such training the boon to both horses and owners will be incalculable. Part I is devoted to a consideration of the gross anatomy of the horse, and as such contains much that is not relevant to the shoeing of the hoof. More might have been added to explain the beauty of muscular action in the true movement of the limb, and also some of the congenital and acquired conditions in which that harmony is disturbed, and how by shoeing it is possible to relieve or overcome such defects. The description of the bones, tendons, and ligaments enclosed in the horny box and the joints immediately above it is good, so also is that of the blood-vessels and nerves. Much more appropriate and valuable is an excellent description of the anatomy, physiology, and histology of the horn and its secreting membranes. Space does not permit lengthened criticism; to the shoeing smith it is immaterial whether the horny laminæ are secreted from the sensitive laminæ or whether they are, as described by Chauveau (p. 810), secreted at the inferior border of the coronary cushion; the scientific man will satisfy himself upon the point.

The whole of Chapter II upon the foot in relation to the entire limb is very good, and makes up in some measure for the omission we noted *re* muscles. The diagrams illustrate abnormalities in the shape and disposition of the bones of the limbs. A horse may have a perfectly shaped limb in repose which in action, owing to disturbed harmony of muscular contraction, will give rise to that which is aptly termed in this book defective "flight of hoof in motion." The illustration upon the floor surface is good, but the cycle of movement is not upon the floor, and the defects might be illustrated by deviations of a circle or ring, which have proved in teaching to be easily capable of apprehension. The section upon influence of weights upon hoof in adjusting irregular action is good, so also is that upon various forms of hoofs. These are followed by a very entertaining description of the "physiological movements of the hoof."

Here follows the section of the actual art of horse-shoeing with ample details. The preparation of the hoof to receive the shoe might have included a list of the frequent fashionable mutilations of the hoof so much seen in city forges. The chapter on forging interfering and speedy cutting contains useful information, and that on prevention of slipping is good. Hoof nurture might have been extended. It is most important that every effort should be made to increase both the quantity and quality of defective horn.

Shoeing defective hoofs and lame horses is distinctly a surgical subject, but it is one with which a shoeing smith is of necessity conversant. It is interesting to note that in the treatment of sand

35378

cracks and other longitudinal fissures, the use of the plate and the "vaulting" of the sole immediately under the fissure has long been practised in Liverpool with happy results. The book is well illustrated, many of the diagrams are old friends, it is well printed and agreeably written; it is a most welcome addition to a subject of increasing importance, as by careful, well-considered shoeing it is possible to extend the working days of defective horses, and so help to offer a continued commercial resistance to motor haulage for heavy weights over reasonable distances. Owners of shoeing forges and veterinary students, ante- or post-graduate, will appreciate an attractive educative volume at a most reasonable price. H. S.

Statistical and General Report of the Army Veterinary Service for 1912. Printed by Harrison and Sons, St. Martin's Lane, London. Pp. 100.

This report, issued by Major-General R. Pringle, Director-General A.V.S., is as interesting as ever to peruse. The man who dabbles in statistics will find food for reflection therein for many days. He will learn that the most useful period of the horse's life in the Army is from 5 to 12 years of age, and that the average service of horses is about five years. There were four cases of anthrax and five of glanders during the year. Anti-strangles serum has been largely used, but the results obtained do not seem to compare favourably with the great amount of labour and expenditure this serum treatment entails. The admissions for catarrh in 1910, 1911, and 1912 were 1,046, 1,162, and 1,140 respectively, so that the use of the serum as a prophylactic does not appear to have reduced the number of cases appreciably. As regards strangles, in 1910 there were 613 cases; in 1911, 470; and in 1912, 554; the admissions per 100 this year were 2·438, whilst in 1911 they were 2·065. The average number of days the horses were under treatment in 1912 was 32·82, whilst in 1911 it was 33·26. In 1910, 3,931 doses of anti-strangles serum were issued, whilst in 1912, 13,050 doses were given out. The above-mentioned results and comparisons do not seem to prove that the use of the serum has been of much benefit, and yet the number of experiments appear to have been sufficient to form a judgment. Ninety-four horses became "affected in the wind after inoculation." Ringworm shows an increase. In 1911 there were 1,068 cases, and in 1912, 1,130. In 1910 there were 50 cases of ostitis; in 1911, 74; and in 1912, 126. The numbers show a considerable increase, which may be explainable. 121 horses were cast as roarers, and 62 were operated on, of which "31 improved, 22 did not improve, 8 were not tested, and 1 died." The report does not say whether any cures resulted, and is not so gratifying as those obtained from other quarters (British, American, German, and Italian).

Sprains of tendons and ligaments seem to incapacitate the greatest number of Army horses, and diseases of the digestive

and respiratory systems come a good second and third place respectively.

The Reports of the Army Veterinary Service in South Africa and a Report on the horses, mules, and camels in Egypt for the year ending March 31, 1913, are included in the present publication. In Egypt sand colic appears to have almost become extinct, and this has been brought about by an altered system of feeding and the use of muzzles whilst the horses have been standing in camp and open lines. The Annual ends with a short report on the Army Veterinary School, Aldershot. From it we learn that two classes in animal management, three farriers' classes, and eight classes for officers of the Army Veterinary Corps have been held during the year, a very useful record of work done in this school.

P.S.—We notice that all the cases of pneumonia appear to be *sporadic*. There is no record of any influenza cases, which is rather remarkable, and thirteen cases of syncope with death would hardly seem to be rightly classified under "Circulatory Diseases."

G. M.

Tropical Veterinary Bulletin. Issued under the direction of the Honorary Managing Committee of the Tropical Diseases Bureau, Imperial Institute, S.W. Sold by Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, W.C. Editor: A. L. Sheather, B.Sc., M.R.CV.S. Price 3s. net.

The fifth number of vol i of this *Bulletin* contains references to a wide range of subjects, and will be quite as useful as its predecessors to those concerned with tropical diseases and medicine. Babesiasis and anaplasmosis, trypanosomiasis, and the part played by intermediate hosts as regards the human trypanosome, spirochætosis, leishmaniasis, taxoplasmosis, &c., are all referred to, and the literature overhauled seems to be well up to date. To bacteriologists and protozoologists the periodical must be very valuable, and the wide range of animal and human diseases which are peculiar to the Tropics indicates the necessity of reliable literature on the subject. Unless one is acquainted with the importance and proportion in the land of origin of many of the tropical diseases referred to, one can hardly review this quarterly publication adequately. Glancing through it we notice the first unfavourable review (if it may be called a review, for it only consists of a few lines) we have yet read of Mr. Scott's work on "Clinical Bacteriology and Vaccine Therapy." We think that a well-written review of a book ought to do more than call attention to a few errors in spelling. On p. 259 of the *Bulletin* we notice "Beobachtungen über, &c.," translated as "the occurrence of"; über die Kultur" on p. 261 translated as "the cultivation of"; and on p. 293 "Ueber die Morphologie und das Verhalten" translated as "the Morphology of, &c." The authors of these articles are entitled to a little more care in the translating of the titles of their works.

G. M.

Annual Report of the Muktesar Laboratories. By the Imperial Bacteriologist (J. D. E. Holmes).

A report of the work and products of this Laboratory has recently been published and is full of interest. Some idea of the enormous amount of useful work done by this institution may be gathered from the fact that in 1910 over a million doses of anti-rinderpest serum were manufactured. Added to the many difficulties which attend the use of sera in the ordinary way veterinarians in India have to contend with native prejudices, and in vaccinating it is most important to ensure that working oxen are not incapacitated even for a day.

Reports of research work conducted at the Imperial Laboratory have frequently appeared in the Indian medical journals, in the *Centralblatt für Bakteriologie*, and in English veterinary periodicals. The first of these were the work of Dr. Lingard, who in 1890 was appointed Imperial Bacteriologist, though the work was then conducted at Poona. In 1893 the Muktesar Laboratory was built and Lingard was at its head until 1908, when he was succeeded by Captain (now Major) J. D. E. Holmes, the present Imperial Bacteriologist. The publications cover a wide range of subjects, including dourine, epizootic lymphangitis, anthrax, hæmorrhagic septicæmia, bursitis, black quarter, and piroplasmosis. Finally, there is a report by Major Holmes on the cure of thirty-two cases of surra by the administration of atoxyl, followed by a course of arsenious acid in increasing doses, according to the tolerance of the animal. If the success of these cases is followed by others, and the method proves of practical value in even the greater proportion of animals treated, horse owners and the Government of India will be deeply indebted to the investigator.

Mallein, blacklegoids, hæmorrhagic septicæmia vaccine, anthrax serum, and the rinderpest serum are all made at the Laboratory, but tuberculin, for which the demand is small, is purchased.

The report gives a clear idea of the arrangement of the institution, and it is surprising to workers in England to read that the Laboratory estate covers 7,000 acres, and has an elevation of over 7,000 ft. With such an area available the buildings are well isolated and sheds are provided for dealing with each of the more deadly diseases, as well as separate "out-kraals" for experimental cattle. About forty clear photographs show that the laboratories are well equipped and good provision seems to be made for the native office itself. For officers of the Army Veterinary Department who attend for two months courses of post-graduate instruction, a bungalow is provided, and a club has been established with tennis and Badminton courts, &c.

Could such publications as this under consideration be in some way brought to the notice of the general public, it would do much to increase the value of the estimate at which the services of the veterinary profession are generally esteemed.

Annual Administrative Report of the Bombay Veterinary College and Civil Veterinary Department in the Bombay Presidency, including Sind, for the Official Year 1912-1913.

The Report of the Bombay Veterinary College as submitted by Mr. K. Hewlett, M.R.C.V.S., the Principal, shows that veterinary matters are advancing in the Presidency. The number of students in the College has slightly increased, the majority coming from the Bombay Presidency. The number of cases of glanders and surra has decreased. There are twenty-seven scholarships awarded by Government for students of the College. Tennis courts and a cricket ground have been provided for the students ; 3,450 in-patients and 3,006 out-patients have been treated at the College. The average daily attendance of patients was 263. All the students who passed out of the College in 1910 are employed, and 21 out of 25 qualifying in 1911 are working. The Examination Committee report that the students have been well taught and that the results are satisfactory.

Lieutenant-Colonel H. M. Maxwell reports on the Civil Veterinary Department. He inspected many veterinary dispensaries and the stallion stations, whilst Mr. J. D. Buxy, recently appointed Deputy Superintendent, ably assisted his chief, especially with such work as preventive measures against anthrax, rinderpest, and glanders.

Twenty-five more cases of rabies were reported than in the previous year. The total was 75 as against 50.

There are forty-two stud bulls belonging to local bodies operating in the Presidency, and thirty-five stallions are on the register.

The whole report is gratifying, and shows how much has been done, and suggests how much there is to do. The field is wide and the work plentiful.

The Agricultural Journal of British East Africa, March, 1913. Edited by the Staff of the Agricultural Department. Printed at the Standard P. and P. Works, Nairobi.

This quarterly publication gives evidence of doing very useful work. In the editorial at the commencement of the journal attention is called to the fact that the Council of the British Dairy Farmers' Association is creating a special class at next year's dairy show for bacon cured anywhere throughout the British Empire. The artificial drying of coffee (usually sun-dried) is described as conducted by Mr. Cooper and Mr. Monson at Kabete Farm. The plant for drying tobacco was used by these gentlemen, and apparently some very good results were produced, showing that in future coffee and tobacco may be dealt with on the same farm, more land put under cultivation, and more profit obtained. The article on "Ostrich Farming," by Professor Duerden, is well illustrated, and gives an interesting account of the industry. Captain C. A. Neave, in a paper on "Pack Animals v. Porters in B. E. A.," calculates that a saving of £5,100 would be made in wages if pack animals (mules and donkeys) were substituted for porters by travelling officers. The risks of dealing with large bodies of indifferent attendants would

also be obviated. "Linseed and its Culture" is discussed by James Johnston, and "Citrus Culture" by W. T. Barlow, whilst H. W. Buckland, in a short article on "Apple Growing in British Columbia," calls attention to the fact that the usual area for an apple orchard is from ten to twelve acres, and that ordinary fruit land costs from £40 to £50 per acre. The periodical concludes with "Notes from Exchanges" and "Government Notices." In the former we notice the following for destroying ants in the house: Make a syrup of sugar and water, to which add some powdered borax, and evaporate to a honey-like consistency. Place this about the nests and on the shelves of the house. To protect stock from flies, apply this mixture to the skin with a brush: 1½ lb. resin, 16 oz. soft soap, 10 oz. of fish oil, and two to three gallons of water. G. M.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editors.

Manuscript—preferably type-written—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.